U.S. Environmental Protection Agency
Science Advisory Board
Radiation Advisory Committee

Summary Minutes of Public Meeting
November 17-19, 1998

Committee: Radiation Advisory Committee (RAC) of the U.S. Environmental Protection Agency's Science Advisory Board (SAB). (See Roster - Attachment A.)

Date and Time: Tuesday, November 17 through Thursday, November 19, 1998 9:00 a.m. to 5:30 p.m. Eastern Time (See Federal Register Notice - Attachment B).

Location: Science Advisory Board Conference Room, M3709, US EPA, 401 M Street, SW, Washington, DC 20460

Purpose: To (a) briefly discuss projects planned for review in Fiscal Year (FY) 1999; (b) conduct an advisory on low-activity radioactive waste and prepare an initial draft at the meeting; (c) hold a consultation on approaches to calculate radon risks in light of the National Academy of Sciences (NAS) Biological Effects of Ionizing Radiation committee's report (BEIR VI) on risks from indoor radon exposures; (d) receive a briefing on the National Academy of Sciences Naturally Occurring Radioactive Material (NORM) report; (e) conduct a closure review of the draft report on uncertainty in radiogenic cancer risk prepared by the RAC's Uncertainty in Radiogenic (Cancer) Risks Subcommittee (URRS); and (f) discuss other projects as time permits. (See Meeting Agenda - Attachment C.)

Attendees: Committee Members (Drs. Stephen L. Brown, RAC Chair, William Bair, Vicki Bier (day #1 & 2), Calvin Chien (EEC Liaison), Thomas Gesell, David Hoel (EHC Liaison), F. Owen Hoffman (day #2, only), Janet Johnson, Jill Lipoti (day #1 & 3), Paul Merges, and Genevieve Roessler - all above members and consultants were present - see Attachment A); Dr. K. Jack Kooyoomjian (Designated Federal Officer - SAB Staff). In addition, Dr. Steven Simon, Representative from the NAS, was invited to present NAS findings on NORM (day #2 only). (See Meeting Sign-In Sheets for Attendees - Attachment D.)

Environmental Protection Agency Participants included Dr. Mark E. Clark (ORIA), Mr. Jim Cumberland (ORIA- day #1), Mr. Kenneth Czyscinski (ORIA), Ms. Jacolyn Dziuban (ORIA/RPD- day #1), Ms. Rafaela Ferguson (ORIA/RPD- day #1), Ms. Betsy Forinash (ORIA), Mr. Shankar Ghose (ORIA/RPD- day #1), Ms. Susan Hernandez (ORIA-day #1), Dr. Cheng Hung (ORIA/RPD-day #1), Mr. James Gruhlke (ORIA-day #1&3), Ms. Mary Kruger (ORIA),

Ms. Caroline Laikin (ORIA- day #1), Mr. David Levenstein (Mail Code 2261A- day #2), Mr. Christopher Nelson (ORIA), Dr. David Pawel (ORIA), Mr. Loren Setlow (ORIA- day #2), Mr. Bchram Shroff (ORIA- day #1), Mr. Dan Schultheisz (ORIA), Ms. Glenna Shields (ORIA/RPD- day #1), Ms. Ceia Wene (ORIA- day #1), Ms. Sharon White (ORIA- day #1) (of the Office of Radiation and Indoor Air, ORIA, US EPA). (See Meeting Sign-In Sheets for Attendees - Attachment D.)

Other Participants from the Public included Dr. Gary Kayajanian (Representing self), Mr. Dominick Orlando (U.S. NRC), and Mr. Gustavo Vazquez (U.S. DOE). (See Meeting Sign-In Sheets for other Attendees - Attachment D.)

Drs. June Fabryka-Martin, Hilary Inyang (EEC Liaison), Donald Langmuir, Ellen Mangione, Frank Parker, John Poston, and James E. Watson, Jr. (Former RAC Chair) were invited but were not present. Dr. Inyang provided advance written material for the meeting, since he would be unavailable at the meeting (see Attachment O-3). Drs. Langmuir and Fabryka-Martin provided editorial feedback and written materials in the course of the review.

Meeting Summary:

The meeting followed the issues and general timing as presented in the meeting Agenda, except where otherwise noted (see Meeting Agenda - Attachment C). There were no written comments submitted to the Committee, nor were there any requests made to present public comments during the meeting.

Welcome and Introductions - Dr.Stephen L. Brown, Chairman, opened the meeting at 9:00 a.m,. welcoming members and consultants (Roster, Attachment A), and reviewed the meeting agenda (Attachment C). He thanked the outgoing members who were present (Dr. Merges on day #1 and Dr. Hoffman on day #2; Dr. Fabryka-Martin was not present). He also welcomed the new members, Drs. Vicki Bier and Jill Lipoti.. Dr. K. Jack Kooyoomjian, Designated Federal Officer for the RAC provided brief instructions for the disclosure process, mainly for the benefit of the new RAC members, and the public not familiar with the procedures. He also noted the materials which had been provided to Committee and noted that a complete set of materials was available at the meeting for reference purposes, along with handouts provided by the Office of Radiation and Indoor Air (ORIA), including copies of handouts and briefings for the presentations to take place during the meeting. He reminded panelists that contacts with the Agency or public during the Committee deliberative phase (i.e., prior to production of a consensus draft report) should involve the DFO to avoid the perception of undue influence. He described the process for completing a final report to be sent to the Administrator, including the production of a public draft, and review and approval by the Executive Committee. Then he requested that panel members introduce themselves and make a voluntary statement for the record regarding their research interests and experiences and relationship of their organizations to the review topics to be discussed. Dr. Janet Johnson had noted that her former employer, the University of Colorado, had been fined on a mixed waste radionuclide issue, however this and other disclosures did not identify any “particular matter” conflicts of interest.

Dr. Kooyoomjian presented a certificate of appreciation from the Administrator to Dr. Merges, along with an orginially minted (limited edition) EPA pin, Dr. Merges thanked the Agency for the opportunity to be of service and the satisfaction to be of assistance.

Summary of Meeting: Day #1:

Consultation on Approaches to Calculating Radon Risks (Item II on Agenda):

Dr. Mary Clark introduced the topic, and Dr. Jerry Puskin began the presentation [See Briefing Package entitled "Estimates of Radon Risk (NAS BEIR VI Report) - Presentation to RAC," by Dr. Jerry Puskin, EPA/ORIA, Nov. 17, 1998 -- Attachment F]. Dr. David Pawel, EPA/ORIA followed up with additional details on calculating risk per working level month [See Briefing Package entitled "Calculating Risk per WLM (Working Level Month) for Radon-Related Lung Cancer Deaths," Presentation to the RAC by Dr. David Pawel, EPA/ORIA, Nov. 17, 1998 --Attachment G].

Dr. Brown noted that this consultation is a genuine opportunity to look at the risk estimates and uncertainties of the various components. Discussions with the RAC centered on making sense of the existing data and how existing research of others (Moolgalvkar, Cohen, Samet & Lumen, etc.) should relate to the risk calculations. Identification of the target population and what questions should be asked relating to what results are expected, use of the miner exposure data, use of relative risk estimates that include the entire range of concentrations, biological explanations for inverse dose-rate effects, the desirability for re-testing of homes every 3 to 5 years, differences in the respiratory traits of smokers versus non-smokers, the preferred method to calculate risks per WLM, the suggestion that the concentration model is easier than the duration model for people to grasp, and other topics were discussed.

The consultation had begun around 9:30 a.m. and was completed around 11:16 a.m. The ORIA staff thanked the Committee for the consultation, and proceeded with the advisory on low activity mixed (radioactive) wastes.

Advisory on Low Activity mixed (Radioactive) Wastes (Items III & IV on Agenda):

Dr. Mary E. Clark briefly introduced the topic and the ORIA staff involved with this activity. They included introductions to Mr. Kenneth Czyscinski, Ms. Betsy Forinash, Mr. James (Jim) Gruhlke, Ms. Mary Kruger, and Mr. Daniel (Dan) Schultheisz. She had Ms. Mary Kruger explain the regulatory standard setting role of the EPA on the mixed waste issue and how it relates to the NRC 10CFR Part 61 program. A discussion and technical presentations followed on the advisory relating to each charge question.

Ms. Betsy Forinash presented an overview briefing entitled "Overview of Modeling Approach for the Low Activity Mixed Waste Disposal Project," Presented to EPA/SAB/RAC, Nov. 17-19, 1998 (See Attachment I), as well as a briefing entitled "Policy Framework, Modeling Objectives, Preliminary Modeling, Future Actions and Charge to the Committee." Mr. Dan

Schultheisz presented a technical briefing entitled "Advisory Charge Question 1: Site Characterization for Disposal of Low-Activity Mixed Waste," Presented to EPA/SAB/RAC, Nov. 17-19, 1998. Mr. James Grulke presented Charge question #2 (see briefing entitled "Advisory Charge Question #2: Modeling Time Frame," Presented to EPA/SAB/RAC, Nov.17-19, 1998. Mr. Kenneth Czyscinski presented Charge Question #3 entitled "Advisory Charge Question #3: Concrete Degradation," Presentation to EPA/SAB/RAC, Nov. 17-19, 1998 (See Attachments J, K, and L).

Discussion points followed the entire morning and included the modeling approach, the conditions for disposal under RCRA Subtitle C, the need for modeling site variability, why the DOE sites were used for modeling, whether the DOE site characterization data adequately characterized the hydrologic and climatic settings that might be reasonably expected for commercial disposal of low activity mixed radioactive wastes, deterministic versus probabilistic modeling, the incentive to expand the disposal options for mixed low activity radioactive wastes, whether the 1,000-year time frame is adequate, the modeling of concrete degradation, the cement/concrete degradation mechanisms, the RCRA-C disposal cell environment and related topics. The Committee and participants adjourned for lunch at 12:30 p.m. and reconvened at 1:30 p.m..

A question and answer (Q&A) session followed after lunch. Dr. Brown opened the discussion by noting that he appreciated the thoroughly prepared briefing materials and the nice balance between comprehensiveness and brevity that was achieved by the ORIA staff. Topics covered the bounding analysis within the DOE sites instead of the 22 RCRA sites that received low activity mixed radioactive wastes (LAMRW), whether future plans included adding additional sites with broad ranges of conditions, analysis of the mobile versus the immobile scenarios, the concern for other environments (e.g., Hawaii, Greenland, Alaska, etc.), how the waste compact states would use this information, the extraordinary expense of disposing of LAMRW at the Barnwell site, enforcement and compliance provisions, restrictions on waste flow and interstate commerce from mixed wastes, social and environmental justice concerns for already existing facilities, protecting workers at licensed sites and limitations on worker exposure and related issues.

Discussions followed in particular on an overview of the modeling approach and the domain of applicability that the Agency is trying to support, as well as the wastes that are intended to be covered by this rule. Topics covered the usefulness of multi-media models, how the PRESTO model interfaces with other models and the user-friendly aspects, what diminimous levels of individual radionuclides could be disposed of in RCRA Subtitle C facilities, the need to run sensitivity analyses for determining when peaks occur, whether wastes would be restricted that do not meet the Land Disposal Restrictions (LDR), the issue of scaling up tests to field conditions, whether gaseous mixed wastes (e.g., Krypton and mercury vapor) would be allowed, how to avoid exploding canisters in vitrified soils as had occurred at Hanford, and a number of related issues. Focused discussion occurred on the modeling time-frame, and whether the Agency should model the peaks, which could go far beyond 1,000 years in some cases.

The Committee asked with regard to the concrete calculations if the model shows a depleting source, and the ORIA staff indicated that this was the case. The question was then posed regarding a scenario with waste that contained both hazardous and radioactive (mixed) materials, and what would be done to that waste stream. The ORIA staff indicated that such a mixed waste stream would have to be pretreated, and that treatment standards would apply. Other issues touched on the case of state ownership of land, the scenario of certain very mobile radionuclides such as tritium, and implications of addressing risks in those time-frames of concern to deal with the peaks.

PUBLIC COMMENTS: At approximately 3:05 p.m., Dr. Brown asked for public comments. None were offered at this time.

Organizing for Writing Session (See Item IVc and Ivd on Agenda): Dr. Brown then asked Dr. Kooyoomjian to hand out written comments of Drs. Brown, Merges, Gesell, and Inyang and the Committee discussed options on how to tackle the writing assignment.

The Committee took a break from 3:13 p.m., reconvened at 3:30 p.m., resuming the organizing session. Dr. Brown had the Committee discuss the three charge questions in a round-the-table format. Issues discussed included state positions regarding the time-frame, such as New York's 10,000 years for a dose assessment period, uncertainty in both the models and the values, the different hydrologic and climatological conditions to be encountered at various sites. Different approaches, such as using worst-case sites and conditions , or using average numbers, or conducting a "bounding analysis" were discussed. It was suggested that availability of real-world field data such as at Rocky Flats, Argonne, Brookhaven, and West Valley could be helpful.

It was noted that not all RCRA C facilities are built to the same standard, and the Committee asked to what extent had ORIA staff looked at the RCRA Subtitle C criteria. The ORIA staff acknowledged that not all conditions, such as seismic, population, porosity of surface, entrainment, depth to saturated zone, etc. are spelled out in detail in the criteria. The Committee made a number of suggestions such as atmospheric stability criteria should not be the same for all sites.

The Committee discussed Charge Question #2 regarding the time-frame. Discussions occurred in the round-the-table format and included issues of technical accuracy, public acceptance, the role of science, when peaks would occur with performance assessment modeling (e.g., around 2,000 years), the value of performance assessment modeling, the need for radiation protection to be reasonably protective of public health, as well as enforcement and compliance issues. It was noted that most people have a hard time thinking beyond 500 years, and that some people have trouble thinking beyond 100 years because of the cancer risk component. It was noted that exposure levels between 1,000 years and 10,000 years do not show a lot of difference, and there is a tendency by some people not to project beyond what is absolutely necessary. A discussion followed on long-lived radionuclides, and that some of the Committee do not find the 10,000 year model to be too restrictive, while others were more comfortable working with the 1,000 year time-frame.

A discussion also occurred on Charge Question #3 regarding concrete degradation. The Committee observed that risks on an individual basis could exceed total collective risk, that 300 years from now concrete could degrade into the soil, that the quality of the concrete could be specified, that the quality of concrete could improve in the future, whether other materials could be used, etc.

The Committee then organized for the writing session. Dr. Brown had the participating members/consultants (M/C) assigned to the Charge questions. The following assignments evolved:

Charge #1: Geologic and Climatological Settings: Drs. Chien, Gesell, and Merges.
Charge #2: Time-Frame: Drs. Bair, Beir, Chien, Lipoti and Roessler.
Charge #3: Concrete Degradation: Drs. Brown and Johnson.

V. Closing Comments: There being no additional business, the Committee adjourned at 5:25 p.m.

Summary of Meeting: Day #2:

Dr. Brown reconvened the meeting at 9:00 a.m.(See Agenda Item VI), suggesting that the Committee should conduct a writing session after discussing the assignments and issues this morning. Dr. Brown suggested that the Committee continue the round-the-table dialogue, since the Committee has had time to mull over the issues that need to be discussed with one-another. The Committee agreed with this suggestion and continued the dialogue, noting a number of observations such as the following: It is almost always much cheaper to dispose of hazardous waste than radionuclide waste. Need to look at hazardous, radioactive, special nuclear material and mixed waste from the perspectives of the waste generator, regulator, etc. and in terms of acceptable risks. There is pressure on the disposal problem at power plants, which has likely led to premature decommissioning of some of these facilities. There are numerous challenges at the Federal, state and private level regarding institutional controls and the challenges for these institutions. There is a concern for existing RCRA Subtitle C facilities and the mobility of hazardous waste which could also enhance mobility of radionuclides. There are concerns for uncertainty in the models and whether the Agency is capturing the information and whether the results can be repeated, that is, replicated by others with regard to regulatory compliance.

With regard to models and modeling, it was suggested that other models should be run in parallel with PRESTO, such as RESRAD and MEPHOS, and compared with the NRC models. It was suggested that it would strengthen the Agency's draft document to display the rationale and demonstrate that PRESTO is up-to-date and has gone through internal and other quality reviews. It was observed that the OSW's RCRA program has not done the same sort of modeling that ORIA has to deal with low-level mixed waste. Some discussion also took place on scenarios dealing with what is the best public policy for dealing with such wastes and the liabilities of various parties. Some specific problem disposals were discussed. Suggestions were made to consider a separate set of guidelines for dry and wet wastes and to consider the effect of wet/dry and freeze/thaw cycles on waste mobility, and how these factors might affect the setting of allowable limits for low level mixed radioactive waste.

The Committee took a lunch break at 12:15 p.m. to 1:15 p.m. and when they reconvened, Dr. Hoffman conducted a voluntary disclosure and presented the Uncertainty in Radiogenic Risk Subcommittee (URRS) Draft report edits for discussion and approval of the Committee (See Item VIII of the Agenda). Dr. Kooyoomjian presented Dr. Hoffman with a certificate of appreciation from the Administrator, as well as a limited edition EPA pin. Dr. Kooyoomjian introduced the edits process and highlights of the changes to the current URRS draft . Dr. Brown indicated concurrences received by members, and Dr. Hoffman highlighted a few items for discussion. A few suggestions were made in the letter to the Administrator and in the text, and the report was approved by the Committee.

At 2:15 p.m., Dr. Simon of the National Academy of Science (NAS) gave a courtesy briefing on the NAS's NORM Report (See Agenda Item IX). Dr. Simon highlighted the three charge questions to the NAS from the EPA and the conclusions, using the Executive Summary of the NAS Report entitled "Evaluation of Guidelines for Exposures to Technologically Enhanced Naturally Occurring Radioactive Materials," pre. Publication copy, 1998, National Academy Press, Washington, D.C. A discussion followed which touched on differences based on risk management and policy areas, the issue of natural background, and the treasure trove of information in the risk table in the report, among other topics.

The Committee took a break from 3:13 p.m. to 3:28 p.m. and reconvened for a re-cap and planning session until 4:10 p.m. and then adjourned for a writing session for the balance of the day (See Agenda Item X).

Summary of Meeting: Day #3:

Dr. Brown reconvened the meeting at 9:10 a.m. noting the items to be accomplished today (see Agenda Item XII), namely an ORIA briefing and courtesy update on FY 1999 projects, RAC planning for FY 1999, completion of the writing session and a debriefing to the ORIA staff on the low activity mixed waste (LAMW) advisory.

At 9:15 a.m., Dr. Mary E. Clark gave a briefing and courtesy update on proposed FY 1999 projects for the SAB/RAC (See Agenda Item XIII). She noted that Steve Page has recently been selected as the new Office Director of ORIA, and that Larry Weinstock had been Acting Director of ORIA for a year and a half. She mentioned some staff changes, noting that Nick Lailas retired one year ago, Al Colli will retire shortly, Frank Marcinowski is Division Director and the WIPP Center Director, and other details. At the senior management level she noted that Bob Perciasepe is the new Assistant Administrator for Air and Radiation and that Peter Robertson is the Acting Deputy Administrator. She also discussed the six (6) centers and the regional laboratories and the personnel shifts at the radiation laboratories, noting in particular the recent retirement of Sam Windham as Director of the Montgomery, Alabama Laboratory, and Edwin (Ed) Sensintaffer as the Acting Director, and John Griggs as being in charge of ERAMS and handling MARLAP. She also mentioned the coordination work going on in the monitoring area between the EPA and DOE laboratories.

Dr. Clark also discussed the status of the ORIA budget and answered questions from the Committee. She noted that a Conference on Risk (Risk Harmonization) is being held in Annapolis by the Environmental Law Institute (ELI) and sponsored by the ISCORS (Inter-Agency Committee on Regulatory Standards). Discussions covered topics of MARLAP (Multi-Agency Laboratory Analytical Procedures) and review of inter-Agency protocols, NELAC (National Environmental Laboratory Accreditation Conference), whether the ERAMS II Advisory made a difference and other topics.

With respect to the upcoming RAC meetings for FY 1999, Dr. Clark highlighted the need for an advisory on Radon Risk Assessment, noting its use in the radon in drinking water standard for the Office of Water and how it will be incorporated a part of an MCL (Maximum Contaminant Level) package, as well as its application in the HEAST (Health Effects Advisory Summary Tables) with regard to management of risks in the Superfund program. She also noted the need for a consultation on NORM at the RAC's next meeting. A discussion also followed on the HWIR (Hazardous Waste Information Rule) by the Office of Solid Waste, with the SAB/EPIC and EEC review of this topic having been completed, and how the Low Activity Mixed Waste advisory is related to this topic. Dr. Clark handed out courtesy informational copies of the BEIR VII advance copy, dated July 10, 1998 entitled "Health Effects of Exposure to Low Levels of Ionizing Radiation: Time for Reassessment?" (See Attachment M). A brief discussion followed on funding of the BEIR VII study by EPA, DOE and the NRC.

Following Dr. Clark's presentation, Dr. Brown conducted a discussion on RAC planning for FY 1999. It was noted that the NCRP (National Council on Radiation Protection and Measurement) Annual meeting is April 6-8, 1999. Various dates were discussed for the next meeting, and it was decided to tentatively schedule March 23, 24, and 25 with back-up dates of April 13, 14, and 15, 1999. For the summer meeting, the preferred dates are August 24, 25, and 26, with back-up dates of September 14, 15, and 16, 1999.

From 10:10 a.m. to 10:55 a.m. the Committee read the draft advisory synthesized by Dr. Brown (a 25-page draft that was prepared the previous day (and evening) by him, which consolidated everyone's inputs). The Committee took a break from 10:55 a.m. to 11:10 a.m. and reconvened for a writing session (See Agenda Item XV) at 11:10 a.m.. Dr. Brown then suggested a round-the-table for each person to identify their most important point and to continue until all major points were raised and discussed. The Committee members identified issues pertaining to worker exposure and safety, licensing of facilities by the NRC or the Agreement States with respect to worker safety, various statements that needed clarification, whether some items needed to be deferred to the NRC, the issues of regulatory burden and regulatory control, ownership issues and restrictions, discussions on the RCRA Subtitle C process, controls and restrictions. Discussions continued on whether RCRA Subtitle C facilities can accept weapons-grade materials, options that already exist for alternative licensing criteria, cancer incidence versus cancer mortality, siting criteria and performance assessment, conditions promoting advanced mobility, conditions where multiple models might be considered, especially if the models show divergent results, interpretation of peak dose simulation, LDR (Land Disposal Restrictions) under RCRA Subtitle C, containment designs for RCRA Subtitle C facilities as well as DOE facilities,

the issue of in-growth of radionuclides, and a number of other topics pertaining to edits of the current draft as presented by Dr. Brown.

The Committee agreed that a public teleconference would be held on December 15, 1998 from 11:00 a.m. to 1:00 p.m. to further refine the draft LAMW advisory.

The Committee conducted a debriefing on the LAMW Advisory (See Agenda Item XVI). The Committee focused on the three charge questions. Briefly touching on some highlights:

Charge #1 (Hydrogeologic and Climatic Settings): The Committee noted that there are other sites that have climatic and hydrogeologic settings of interest, namely in Hawaii, Alaska and the territories that should be looked at.

Charge #2 (Time-Frame): The Committee encouraged the ORIA staff to think about modeling longer time frames. A discussion ensued on the scientific, land-use, ownership, public acceptance and economic aspects of the time-frame issue.

Charge #3 (Concrete and Modeling Scenario): The Committee appeared to be unconvinced by the argument that peak doses and time to peak doses are insensitive to the model. The Committee encouraged that these conditions should in fact be modeled.

A discussion ensued on the types of concrete (such as sulfate-resistant concrete), conditions that might change the parameters, the need for the technical support document and modeling exercise to support rulemaking with regard to random emplacement versus source modeling. Specifically, the Committee stressed the need for the PRESTO model to be justified, how the total quantity of waste affects choices and regulatory assumptions, why various scenarios need to be run for the mobile as well as the immobile components, the need to "run the numbers" for wet, dry, and deep sites, the need to harmonize between Low Activity Mixed (Radioactive) Wastes and Hazardous Wastes assumptions. A discussion also ensued on the need to consider risk consequences of reference dose-setting and the potential RCRA and ORIA mis-matches, whether facilities would accept foreign LAMW and other topics. The debriefing concluded at 2:06 p.m..

The Committee conducted discussions on other topics, noting that the SAB Executive Committee retreat suggested that 1/3 of Committee review time be spent on self-initiated review activities. Topics touched on included ISCORS and prioritizing the Radiation Protection Guidance List, the research agenda for the Agency and the fact that ORIA does not conduct research per se, except through ORD. There being no additional business, the Committee adjourned at 2:23 p.m..

Action items:

1) To tentatively schedule the next RAC meeting for March 23, 24, and 25 with

back-up dates of April 13, 14, and 15, 1999. Topics anticipated to be covered include an advisory on approaches to calculating radon risks, and well as a consultation on ORIA's application of the NAS recommendations on NORM.

2) The Committee agreed that a public teleconference would be held on December 15, 1998 from 11:00 a.m. to 1:00 p.m. to further refine the draft LAMW advisory

3) Dr. Jack Kooyoomjian will schedule 15 minutes at the RAC's next face-to-face meeting to discuss ERAMS feedback and whether the RAC's ERAMS II (& ERAMS I) reports made a difference.

4) The RAC also plans to meet August 24, 25, and 26 with backup dates of September 14, 15 and 16, 1999.

At 2:23 p.m. Dr. Brown adjourned the meeting.

Respectfully Submitted:

_____

K. Jack Kooyoomjian, Ph.D.
Designated Federal Official

Certified as True:

_____

Stephen L. Brown, Ph.D., Chair
Radiation Advisory Committee

LIST OF ATTACHMENTS

ATTACHMENT	DESCRIPTION
A	RAC Roster
B	*Federal Register* Notice, dated October 27, 1998 (Vol. 63, No. 207, pp. 57295-57298)
C	Final Meeting Agenda dated November 16, 1998
D	Meeting Sign-In Sheets
E	Meeting Folder Contents List Containing Mailings to the RAC Dated October 21, 1998 and October 30, 1998 entitled as follows: 1) October 21, 1998 review package containing review and informational materials for RAC meeting on November 17-19, 1998, and 2) October 30, 1998 review package transmitting draft URRS report dated October 29, 1998 and background SAB reports and Agency responses relating to the Low-Activity Mixed (Radioactive) Waste Advisory
F	Presentation by Dr. Jerry Puskin, EPA/ORIA dated November 17, 1998 entitled “Estimates of Radon Risk (NAS BEIR VI Report,” A Presentation to the Radiation Advisory Committee
G	Presentation by Dr. David Pawel, EPA/ORIA dated November 17, 1998 entitled “Calculating Risk per WLM for Radon-related Lung Cancer Deaths,” A Presentation to the Radiation Advisory Committee
H	Appendix C Health Effects of Exposure to Radon: BEIR VI entitled “Tobacco-Smoking and its Interaction with Radon,”
I	“Overview of Modeling Approach for the Low Activity Mixed Waste Disposal Project, “ Presented to EPA Science Advisory Board, Radiation Advisory Committee, November 17-19, 1998
J	“Advisory Charge Question 1: Site Characterization for Disposal of Low-Activity Mixed Waste,” Presented to EPA Science Advisory Board, Radiation Advisory Committee, November 17-19, 1998
K	“Advisory Charge Question 2: Modeling Time Frame,” Presented to EPA Science Advisory Board, Radiation Advisory Committee, November 17-19, 1998
L	“Advisory Charge Question 3: Concrete Degradation,”Presented to EPA Science Advisory Board, Radiation Advisory Committee, November 17-19, 1998

LIST OF ATTACHMENTS

ATTACHMENT	DESCRIPTION
M	National Research Council, "Health Effects of Exposure to Low Levels of Ionizing Radiations: Time for Reassessment?," Committee of Health Effects of Exposure to Low Levels of Ionizing Radiations (BEIR VII), Board on Radiation Effects Research, Commission on Life Sciences, National Research Council, National Academy Press, Washington, DC, Advance Copy, Friday, July 10, 1998
N	ORIA Response to Dr. Stephen Brown on reconfiguration of ERAMS, dated November 12, 1998
O	Preliminary Written Comments from RAC M/C:
O-1	Dr. S.L. Brown, Nov. 16, 1998
O-2	Dr. T.F. Gesell, undated
O-3	Dr. Hillary I. Inyang, Nov. 10, 1998
O-4	Dr. Paul Merges, undated
O-5	Committee Notes, Nov. 18, 1998
O-6	Committee Summary written in Meeting and Synthesized by Dr. Brown, Nov. 19, 1998 (26 pages)